Educational Research and Review Vol. 5(12), pp. 770-776, December 2010
Available online at http://www.academicjournals.org/ERR
ISSN 1990-3839 ©2010 Academic Journals.

Full Length Research Paper

The effect of Jigsaw IV on the achievement of course of language teaching methods and techniques

Sedat Maden

Department of Turkish Language Education, Faculty of Education, Cumhuriyet University, Turkey.
E-mail: sedd52@gmail.com. Fax: 03462191224.

Accepted 27 October, 2010

The purpose of the study is to compare the effects of Jigsaw-IV and the conventional teaching on the academic achievement of Turkish pre-service teachers as for the language teaching methods and techniques. In this study "pretest–post test with the control group model" was used. The subjects of the study are 62 undergraduate students at the Department of Turkish Language. The control group in which conventional teaching was used (n=30), and the experimental Jigsaw group (n=32) were randomly selected. The data for the groups' academic achievement in terms of language teaching methods and techniques were gathered by means of language teaching methods and techniques achievement test (LTMTAT) as pre-test and post-test, and their views towards the Jigsaw IV technique taken through student opinion form (SOF) were analyzed. As a result of the statistical analysis, it appears there were considerable differences in favor of the experimental group in terms of academic achievement and retention level in language teaching methods and techniques. Moreover, it was concluded that students have positive attitudes towards Jigsaw IV.

Key words: Language teaching, methods and techniques, cooperative learning, Jigsaw IV, conventional teaching.

INTRODUCTION

Language teaching is a multidimensional area since it develops child/adult's language abilities, makes them acquire awareness of native language, and finally builds close relationship with other social skills. Therefore, language teaching should be organized according to the content and learners' characteristics. For the desired achievement, implementing different in-class methods and techniques appears to be both natural and indispensable. Instruction, discussion, demonstration, question and answer, drama, brainstorming, aquarium, circle and jigsaw are only some of these methods and techniques, and these techniques considering the objectives, content and learner's features and needs can be either simultaneously or separately used. In order to reach success in any task, implementation should be carried out according to certain methods. In other words, any task done without any method seems to deviate from its ultimate goal. Thus, teaching method plays a crucial role for a thorough and effective learning (Buyukkaragoz, 1997).

Methods and techniques are the key to ultimate learning, and knowing the way of reaching the goal is as crucial as the goal itself. Reaching the educational goals is dependent upon being able to choose the appropriate method. Choosing the appropriate methods is in accordance with the suitable methods for an effective in-class learning-teaching process. For an effective learning, teachers should be attentive about teaching style, and in order for teachers can be attentive about the method, they should be familiar with the methods available and appropriately use them (Demirel, 1999). The conditions for each method and technique's availability are different. Therefore, teachers should choose the most appropriate methods considering himself/herself, the students, subject matter, and the expected behaviors (Fidan, 1993).

Language teaching is a long process, and the teaching methods are of considerable importance. Most of the language teaching approaches and theories argue that teaching methods obtain their own values being affected by the economic, political, social and educational developments and these methods should be found in

terms of feasibility, intuition, and creativity. The methods and techniques deprived of these features are not appreciated. Due to changing and developing social, economic and educational conditions, the language teaching methods and techniques should be revised and they need to meet the new needs. Teachers should also know their students' characteristics, subject matter and the communicative skills. In this way, they can achieve successful language teaching (Liu and Shi, 2007).

There recently appears a necessity of use of strategies and methods that both students and teachers can discover some solutions to learning of fundamental language skills based on practice together. Likewise, as for the education of language teachers, language learning strategies, efficacy in methods and techniques, participation, subject, providing modeling and meaningful learning should be taken into consideration (Chamot et al., 1993).

Conducting implementations in the teaching of strategy, methods and techniques to language teachers can be effective to achieve in teaching setting. A language teacher who has a constructive, creative and enjoyable personality and has been able to learn several characteristics and functions of teaching methods and techniques can effectively and productively use all the methods in spite of hard conditions (Oguzkan, 1989).

Language and language teaching has a sophisticated structure that a person developing his/her inborn language skills, can consciously use them in terms of complex and specified language use domain/skills (Pinker, 1994: 18). In order to improve this structure, an appropriate and implementation based teaching program should be employed.

No element in language learning and teaching is static but dynamic (Larsen-Freeman, 1997). Literature into language teaching emphasizes that general and specific goals should be assessed. Therefore, particular requirements in language teaching program and teaching should be paid attention (Robinson, 1980).

In the determination of the subject, material, method and techniques and even in teacher education, this detail should be considered. Language teaching methods and techniques should not ignore active participation, critical approach, creative thought production, being practice based, taking examples from daily life and giving the total structure of language while serving on the features of student and the educational content. Among the teaching approaches that can form active learning process and be effective in academic achievement and can need the modern expectations, cooperative learning may attract attention.

Cooperative learning is a type of learning that a subject is learnt with small heterogeneous groups (4 or 7 members) and meanwhile in which group members attempt to teach each other. The methods and techniques of cooperative learning enhance students' self-confidence and in this view, students actively join the learning actions (Parker, 1985; Slavin and Sharan, 1990; Slavin, 1991; Bolling, 1994; Coppola and Lawton, 1995; Gardener and Korth, 1996; Johnson and Johnson, 1999; Bowen, 2000; Levine, 2001; Prince, 2004; Eilks, 2005; Graham, 2005; Maloof and White, 2005; Gilles, 2006; Hennessy and Evans, 2006; Lin, 2006; Prichard, Bizo and Stratford, 2006). Cooperative learning, in addition, is a covering term for the educational approaches that require an intellectual effort of both teacher and student, and only student individually or in group (Delucchi, 2006).

As a teaching tool, that is a part of cooperative learning approach, Jigsaw was first used by Eliot Aronson in 1978 to improve the collaboration of students that includes two different actions of small groups (Hedeen, 2003).

As for application phase of Jigsaw technique the following are highlighted:

i) Forming groups (consisting of 4 or 7 students); preferably heterogeneous ones.
ii) Dividing the materials (the subject is divided into smaller parts in accordance with the number of students. Each part is given to one student.
iii) Creating expert groups (valid for Jigsaw technique).

Students leaving their own groups form new groups with other students who are responsible for preparing the same subject. These groups called "expert" attempt to clarify the subject, make plan about how to teach the subject to their classmates and then turn back to their own group teach their subject as they have done in the expert group. At the last phase, teacher makes an either individual or small group activity in order to complete their learning. For example, teacher can make one of the actual group's students present one of the subject materials. As for the evaluation, using the evaluation tools that are employed in cooperative learning, the study is completed (Simsek, 2007: 19).

Through some studies into Jigsaw technique, the implementation phase has been somewhat changed and diverse types of this technique has occurred. Apart from Jigsaw I, Jigsaw-II (by Slavin, 1987), Jigsaw-III (by Stahl, 1984), Jigsaw-IV (by Holliday, 2000), Reverse Jigsaw (by Heeden, 2003) and Subject Jigsaw (Doymus, 2007) have been developed.

The jigsaw technique can enhance cooperative learning by making each student responsible for teaching some of the materials to the group. In this technique, students are members of two different groups, the "home group" and the "jigsaw group." Initially, students meet in their home groups, and each member of the home group is assigned a portion of the material to learn as an "expert" (Doymus et al., 2004; Slavin, 1991).

The language teaching profession has mirrored these theoretical trends with approaches and techniques that have stressed the importance of self-esteem, intrinsic motivation, students cooperatively learning together, of developing individual strategies for constructing meaning, and above all of focusing on the communicative process in language learning (Brown, 2007: 18).

One of the modern and useful teaching tools that can meet the above mentioned requirements within group working in the axis of cooperation is Jigsaw IV. This technique appears to be more developed for complete learning compared to other Jigsaw techniques (I-II-III). Unlike the other techniques, in this technique whether the expert members are specialized is tested. According to test results, the missing parts of the learning are determined and completed. The same implementation is repeated to the actual group members after the expert members carry out their subject presentation in the actual groups.

The findings of the study are expected to suggest novel implications for further studies in L1 teaching programs (Turkish) and departments and some solutions to the problems in teaching process. This study aims to determine the effects of Jigsaw IV and traditional teaching method on students' academic achievement and students' views about Jigsaw IV in the experimental group in which Jigsaw IV was implemented.

For this purpose, the following research questions were investigated:

1. Are there any significant differences in students' academic achievement in both experimental group in which Jigsaw IV was implemented and in the control group where conventional teaching method was used in terms of pre-test, pos-test and follow-up test scores?
2. What are views of the students in the experimental group about Jigsaw IV?

MATERIALS AND METHODS

In this study, pretest–posttest with the control group model was used and the effects of Jigsaw IV and conventional teaching method on the academic achievements of Turkish language pre-service teachers and their views of Jigsaw IV cooperative teaching technique were investigated. The sample of this study consisted of 62 undergraduates from two different classes enrolled to a native language teacher course during the 2009–2010 academic year at a Atatürk university (Turkey). One of the classes was defined as the control group (n=30) and received traditional teaching method, while the experimental group (n=32) was taught by cooperative learning (Jigsaw IV). At the beginning of the study, Language Teaching Methods and Techniques Achievement Test (LTMTAT) were conducted to both groups as the pre-test. Meanwhile, the scores for both University Entrance Exam (UEE)* and their Grade Point Average(GPA)** were also determined. In the light of the data obtained from LTMTAT, UEE and GPA, whether there were significant differences among students were determined, and experimental and control groups were established by means of random method.

Instruments

Personal information form (PIF)

A personal background form, at the very outset, was submitted to all the subjects of the study asking for gender, GPA and UEE scores. The form was designed by the researcher since the determination of the characteristics of the subjects may be considered to positively affect the research design.

Language teaching methods and techniques achievement test (LTMTAT)

The data about students' academic achievement were obtained via Language Teaching Methods and Techniques Achievement Test (LTMTAT). This test consists of the previous questions of national wide exams. As for the development of the test, a question pool was established consisting of 60 questions, getting the ideas of the other faculty members in the field, the total number was reduced to 33. For the test reliability, a pilot study was conducted on 176 undergraduate students at the department of Turkish teaching department. Analysis determined that the item difficulties were between 0,19 and 0,88; and the internal consistency was calculated as 0,83 with KR-20 technique. Subsequent to the analysis, the items with low reliability were excluded from the scale.

Each question was graded as 1 point. The test LTMTAT was conducted to control and experimental groups as pre-test, post-test and follow-up test.

Student opinion form (SOF)

Students' views about Jigsaw IV were collected via **SOF**. This form was conducted to the students in the experimental group. The purpose of this form is to determine the students' views towards Jigsaw IV.

The form consists of two questions. The responses given by the students have been saved and then the saved responses have been analyzed by making them groups.

Procedure

The researcher has already determined the scope of the samples and the appropriate subject contents for the group teaching. For the methodology, language teaching methods and techniques for Turkish language teaching as a native language was selected. The subject of language teaching methods and techniques was divided into the certain titles according to the number of group members in the light of the literature concerned. This subject was taught by means of both Jigsaw IV and traditional teaching methods and techniques to the control and experimental groups for six weeks three hours each.

In order to determine whether there was a significant difference between the experimental (Jigsaw IV group) and control group's academic achievement, at the very outset LTMTAT was conducted. At this phase, also, students' UEE and GPA scores were gathered in the Personal Information Form. The data obtained showed that there were no significant differences among the students, and the experimental and control groups were formed by means of random method.

Process towards the experimental group

Students in the experimental group were informed of the group works required by Jigsaw IV technique. The characteristics of the students in the experimental group were recorded to the group information form, then, according to this information students were divided into heterogeneous groups (Table 1). Each group was coded by a letter, and 8 groups consisting of four members were provided. The members in the groups were coded according to subject titles, e.g. A1, A2, A3, A4.

In the Jigsaw groups, the subtitles of language teaching methods

Table 1. Schematic view of the implementation

Pre-test	Group	Techniques implemented	Post-test	Follow-up test
PIF	Experimental	Jigsaw IV	LTMTAT SOF	LTMTAT
LTMTAT	Control	Conventional teaching	LTMTAT	

Table 1. Home group plan.

Home group A	Home group B	Home group C	Home group D
A1 A2	B1 B2	C1 C2	D1 D2
A3 A4	B3 B4	C3 C4	D3 D4

Home group E	Home group F	Home group G	Home group H
E1 E2	F1 F2	G1 G2	H1 H2
E3 E4	F3 F4	G3 G4	H3 H4

Table 2. Expert groups distribution plan.

Experts group 1	Experts group 2	Experts group 3	Experts group 4
A1,B1,C1,D1	A2,B2,C2,D2	A3,B3,C3,D3	A4,B4,C4,D4
E1,F1,G1,H1	E2,F2,G2,H2	E3,F3,G3,H3	E4,F4,G4,H4

and techniques were given to the members by means of group leaders.

Subtitle headings for language methods and techniques

A1, B1, C1, D1, E1, F1, G1, H1: Discussion methods and techniques.
A2, B2, C2, D2, E2, F2, G2, H2: Off-classroom teaching methods and techniques.
A3, B3, C3, D3, E3, F3, G3, H3: Group teaching methods and techniques
A4, B4, C4, D4, E4, F4, G4, H4: Individual teaching methods and techniques.

In all groups, the subjects were distributed the way the same coded members took the subject titles (In the form of A1, B1, C1, D1, E1, F1, G1, H1. the same subject was studied). The students were told that after the preparatory studies of the students in their actual groups who had the same codes (e.g. A1, B1, C1) in the experimental groups, establishing the expert groups to study their own subjects then return to their own groups. Four cooperative learning groups with eight members each in the expert groups were formed.

At the first week of the experiment, pre-tests were conducted and the groups determined their subjects to study and a strategically training about the proceeding was given by the researcher. In the second week, they prepared about the teaching materials and language teaching methods and techniques. In the third week, the group members with the same codes were gathered and expert groups were set up. Jigsaw technique aims a learning in the axis of separating and then attaching between the groups. After the beginning of the application, the material like portfolio, worksheets, tests and lesson notes about language teaching method and techniques have been given to the students in experimental group and it has been wanted from them to prepare the subject in terms of these.

These groups, under this purpose, studied on the same subtitle and became experts. In the fourth week, the expert groups got ready about their subject with cooperation, communication and collaboration, and became subjected to an expert test by the researcher. 90% achievement was obtained at the end of the test and the expert groups reported their studies.

In the fifth week, the expert groups separated into the actual groups and then they attached again. After the expert groups returned to their actual groups, they told what they have become expert on the basis of their reports. In the sixth week, one member randomly selected from each group orally presented their subjects. In this way, the subject concerned was taught by the expert members. One of the implementation rules of Jigsaw IV is to retest whether the actual groups adequately learned. For this purpose, a test was conducted and completion training was given to five students who scored below 80% achievement by expert trainers. At the end, the post-test was conducted to the experimental group and the data were collected.

The process towards control group

The subject of language teaching methods and techniques was taught through conventional teaching method to the control group by the researcher. In the control group, the teaching activities of the theoretical information about all the subtopics were given for six weeks three hours each. The daily plans, also, belong to the subjects to be taught through traditional teaching methods, and the course outcome was developed by the researcher. The necessary materials had been prepared. In theoretical classes, the researcher

Table 3. Students' pre-test and post-test scores about language teaching methods and techniques in both groups.

	Groups	n	Mean	S.D.	t	p*
Pre-test	Control	30	16.50	2.31	1.471	0.147
	Experimental	32	17.43	2.67		
Post-test	Control	30	20.93	1.65	4.419	0.000
	Experimental	32	22.88	1.79		

Table 4. Data about pre-test and post-test scores of both groups about language teaching methods and techniques.

Groups		n	Mean	S. D.	t	p
Experimental	Pre-test	32	17.43	2.67	16.825	0.000
	Post- test		22.88	1.79		
Control	Pre-test	30	16.50	2.31	15.701	0.000
	Post- test		20.93	1.65		

straightforwardly taught the topic, and mentioned the critical points as for the skills. At the end of the class, the whole unit was repeated. For the next class, the students were asked for getting ready for the new topic and the preparation at the beginning of the class was tested. At the final stage of the theoretical instruction, the researcher took some feedback and retold the needed parts.

The researcher implemented the study for six weeks in both groups. At the end of this implementation, LTMTAT was conducted as post-test and the follow-up test six weeks later to both groups, whether there were significant differences in the academic achievement and retention level of the students as for the language teaching methods and techniques given these two methods was attempted to determine. The students' views on Jigsaw IV were gathered by means of SOF. The pre-test, post-test and follow-up test scores were analyzed through SPSS.

FINDINGS

Findings about the academic achievement differences between the control and experimental groups

In order to find out whether there were significant differences in terms of LTMTAT between the experimental group in which Jigsaw IV was applied and the control group in which conventional teaching method was used, t test was used in pre-test and post-test scores.

As seen from Table 3, t value of LTMTAT pre-test between control and experimental groups is 1.471 and found to be insignificant at the level of $p>0.05$. This shows that there is no significant differences in both groups' pre-test achievement scores in terms of language teaching methods and techniques.

As for the LTMTAT post-test scores of both groups, t value appears to be 4.419 and found to be significant at the level of $p<0.05$. In addition, while the mean of post-test scores in the Jigsaw IV group is 22.88, the mean of post-test scores in the control group is bigger than 20.93. Therefore, LTMTAT post-test achievement scores of the Jigsaw IV group can be said to be higher than the control group's. t-test was used to find out whether LTMTAT pre-test, post-test and follow-up test scores differed in both groups.

Table 4 displays that t value of LTMTAT pre-test and post-test scores of Jigsaw IV students was found to be 16.825 and significant at the level of $p<0.05$. The data also show that the mean of post-test appears to be higher than pre-test mean. These results suggest that Jigsaw IV technique that was used for the language teaching methods and techniques is effective for achievement.

T value of LTMTAT pre-test and post-test scores of the control group's students was found to be 15.701 and significant at the level of $p<0.05$. These data indicate that the mean of post-test results is higher than the pre-test mean scores. These results suggest that conventional teaching method is effective in the achievement of language teaching methods and techniques.

According to Table 5, t value as for the differences between the scores of LTMTAT conducted to both groups after the 6 weeks of the implementation found to be 3.938 and significant at the level of $p<0.05$. Considering the test (LTMTAT) results, it is seen that Jigsaw IV technique, in the achievement of language teaching and techniques, appears to be more effective than conventional teaching method in terms of learning and retention level.

Students' views about Jigsaw IV technique

Interviews were conducted with experimental group's students to obtain their ideas about Jigsaw IV and they

Table 5. Follow-up test scores about post-test language teaching methods and techniques of both groups.

Groups	n	Mean	S.D.	t	p
Experimental	32	19.30	1.57	3.938	0.000
Control	30	17.33	2.05		

were recorded. These data in groups then are given as follows:

Positive views of the interviewees about Jigsaw IV

Majority from 70 to 90% of the interviewees indicated that Jigsaw IV increased their achievement taught the subject easier and through different angles, group members clarified the topic with original examples, permanently acquired knowledge, enhanced self-confidence, improved cooperation and interaction, provided active participation, arose the aim of reaching knowledge and learning and cooperation became enjoyable.

Negative views of the interviewees about Jigsaw IV

Small number of the interviewees pointed out that Jigsaw IV became time consuming, group members were jealous of one another, the students whose performance were lower, slowed down the successful members, and were unable to work with the other members in long term. Few students also highlighted a preference of teacher instruction instead of group working.

CONCLUSION AND DISCUSSIONS

The findings suggest that Jigsaw IV is more effective than conventional teaching method as for the achievement of L1 (Turkish) pre-service teachers' language teaching methods and techniques. These students also indicated positive attitudes towards Jigsaw IV.

That the mean of the scores in the experimental group (Jigsaw IV) was found to be higher than the control groups' may be due to these students' better learning about their subjects in which the students in the cooperating group carried out their responsibilities, making effort so that their mates could learn better about the theoretical information of language teaching methods and techniques, establishing effective communication with their mates, their active participation into the process. These findings appear to support the arguments of other studies in the literature (Wilson, 1998; Ernst and Byra, 1998; Johnson and Ward, 2001; Huang, 2000; Arripe-Longueville et al., 2002; Barrett, 2005; Ward and Lee, 2005; Tuncel, 2006; Gomleksiz, 2007).

As for the qualitative findings in the study, students often used the expressions that Jigsaw technique enhanced the achievement and self-confidence, developed cooperation and interaction, activated students and arouse the idea of searching. Some of the findings that were reached in the current study as for the students' view about Jigsaw method show similarities with other studies (Bourner et al., 2001; Mills, 2003; Ulmer and Gramer, 2005).

It can be strongly said that use of Jigsaw IV in language teaching methods and techniques positively affects academic achievements of pre-service teachers. Given the findings obtained from both experimental and control groups' academic achievements the following suggestions can be given:

1. Jigsaw IV technique apart from language teaching methods and techniques can be used for the teaching of other disciplines of teaching methods and techniques.
2. Jigsaw IV can be effective in the studies of basic language skills teaching for pre-service language teachers.
3. Students should be trained in the studies where Jigsaw would be used.

Cooperative learning groups can easily work on tasks from a task-based approach to language instruction, for instance. Yet cooperative learning is similar to learner strategy training as well in that both require language to teach other skills in addition to teaching language (Freeman, 2003: 169).

Finally, Jigsaw IV method, particularly cooperative learning appears to be effective in language teaching, students' academic achievement, attitudes towards the course and participation in the class. Therefore it can be said that Jigsaw should be used as a teaching tool in teaching process.

REFERENCES

Arripe-Longueville F, Gernigon C, Huet ML, Cadopi M, Winnykamen F (2002). Peer tutoring in a physical education setting: Influence of tutor skill level on novice learners' motivation and performance. J. Teach. Phys. Educ., 22: 105-123.

Barrett T (2005). Effects of cooperative learning on the performance of sixth- grade physical education students, J. Teach. Phys. Educ., 24: 88-102.

Bolling A (1994). Using group journals to improve writing and comprehension. J. Excellence Coll. Teach., 5(1): 47–55.

Bowen CW (2000). A quantitative literature review of cooperative learning effects on high school and college chemistry achievement. J. Chem. Educ., 77(2): 116–119.

Bourner J, Hugnes M, Bourner, T (2001). First-year undergraduate experiences of group project work, Assess Eval. Higher Educ., 26(1): 19–39.
Brown D (2007). Principles of language learning and teaching, USA White Plains: Pearson Education Inc.
Buyukkaragoz S (1997). Program Development in Education. Konya: Öz Eğitim Yayınları.
Chamot AU, Barnhardt S, El-Dinary PB, Carbonaro G, Robbins, J (1993). Methods for teaching learning strategies in the foreign language classroom and assessment of language skill instruction: Final report submitted to the International Research and Studies Program, U.S. Department of Education. Available from Language Research Projects, Georgetown University, 1916 Wilson Blvd., Suite 207, Arlington, VA 22201 USA.
Coppola BP, Lawton RG (1995). Who has the some substance that I have?. A blueprint for collaborative learning activities. J. Chem. Educ., 72(12): 1120-1122.
Demirel Ö (1999). Öğretme sanatı, [Art of Teaching] Ankara: PegemA Yayıncılık.
Delucchi M (2006). The efficacy of collaborative learning groups in an undergraduate statistics course. Coll. Teach., 54(2): 244–248.
Doymus K, Simsek U, Bayrakceken S (2004). The effect of cooperative learning on attitude and academic achievement in science lessons. J. Turk. Sci. Educ., 2(2): 103–113.
Doymus K (2007). The effect of a cooperative learning strategy in the teaching of phase and one-component phase diagrams. J. Chem. Educ., 84(11): 1857-1860.
Eilks I (2005). Experiences and reflections about teaching atomic structure in a jigsaw classroom in lower secondary school chemistry lessons. J. Chem. Educ., 82(2): 313–319.
Ernst M, Byra M (1998). Pairing learners in the reciprocal style of teaching influence on student skill, knowledge and socialization. Phys. Educator, 55, 24-38.
Fidan N (1993). Okulda öğrenme ve öğretme, [Learning and Teaching in Classroom Setting] Ankara: Alkım Yayınevi.
Freeman-Larsen D (1997). Chaos/complexity science and second language acquisition. Appl. Linguistic, 18(2): 141-65.
Gardener BS, Korth SD (1996). Using reflection in cooperative learning groups to integrate theory and practice. J. Excellence Coll. Teach., 7(1): 17–30.
Gomleksiz MN (2007). Effectiveness of cooperative learning (Jigsaw II) method in teaching English as a foreign language to engineering students (Case of Firat University, Turkey), Eur. J. Eng. Educ., 32(5): 613–625.
Graham DC (2005). Cooperative learning methods and middle school students. Ph. D. Thesis, Capella University.
Gilles RM (2006). Teachers' and students' verbal behaviors during cooperative and small-group learning. Br. J. Educ. Psychol., 76(2): 271–287.
Hedeen T (2003). The Reverse Jigsaw: A process of cooperative learning and discussion. Teach. Sociol., 31(3): 325-332.
Hennessy D, Evans R (2006). Small-group learning in the community college classroom. Community Coll. Enterprise, 12(1): 93–109.
Holliday DC (2000). The development of jigsaw in a secondary social studies classroom. Paper presented at the 2000 Midwest Educational Research Association (MWERA) Annual Conference in Chicago, IL.
Huang CY (2000). The effects of cooperative learning and model demonstration strategies on motor skill performance during video instruction, Proc. Natl. Sci. Council, 2: 255-268.
Johnson DW, Johnson RT (1999). What makes cooperative learning work. In Kluge D, McGuire S, Johnson DW, Johnson RT (Ed.) Cooperative learning. Tokyo: Japan Association for Language Teaching.
Johnson M, Ward P (2001). Effects of classwide peer tutoring on correct performance of strinking skills in 3rd grade physical education, J. Teach. Phys. Educ., 20: 247-263.
Levine E (2001). Reading your way to scientific literacy. J. Coll. Sci. Teach., 31(2): 122–125.
Lin E (2006). Learning in the science classroom. Sci. Teacher, 73(5): 35–39.
Liu Q, Shi J (2007). An Analysis of Language Teaching Approaches and Methods-Effectiveness and Weakness. US-China Educ. Rev., ISSN 1548-6613, USA, 4(1): 26.
Maloof J, White VKB (2005). Team study training in the college biology laboratory. J. Biol. Educ., 39(3): 120-124.
Mills P (2003). Group Project Work with Undergraduate Veterinary Science Students. Assess. Eval. Higher Educ., 28(5): 527–538.
Oguzkan F (1989). Teaching in Secondary Schools. Ankara: Emel Matbaacılık.
Parker R (1985). Small-group cooperative learning in the classroom. Oregon School Study Council Bull., 27(7): 1–28.
Pinker S (1994). The language instinct: How the mind creates language. New York: William Morrow.
Prichard JS, Bizo LA, Stratford RJ (2006). The educational impact of team-skills training: Preparing students to work in groups. Br. J. Educ. Psychol., 76(1): 119–140.
Prince M (2004). Does active learning work? A review of the research. J. Eng. Educ., 93(3): 223–231.
Robinson P (1980), English for Specific Purpose. Oxford: Pergamon.
Slavin RE (1991). Are cooperative learning and untracking harmful to the gifted? Educ. Leadership, 48: 68–71.
Slavin RE (1987). Cooperative learning: Student teams, what research says to teachers (2nd ed.). Washington, DC: National Education Association.
Slavin RE, Sharan S (1990). Comprehensive cooperative learning methods: Embedding cooperative learning in the curriculum and school, Cooperative Learning: Theory and Research. New York: Preston Pres.
Stahl R (Ed). (1994). Cooperative learning in social studies: A handbook for teachers. Menlo Park, CA: Addison-Wesley.
Simsek Ü (2007). The effects of the jigsaw and learnıng together techniques applied in solutions and chemical equılıbrıum subjects on learning of the particulate nature of matter by the students and their the academic achievements. In publishing Doctoral Thesis, Atatürk Üniversity, Erzurum, Turkey.
Tuncel Z (2006). The Effects of learning on physical education achievement, social behaviors and cognitive processes. In publishing Doctoral Thesis, Dokuz Eylül Üniversitesi, İzmir.
Ulmer JD, Cramer MM (2005). Why are those kids in groups. Agric. Educ. Mag., 77(6): 14-17
Ward P, Lee MA (2005). Peer-assisted Learning in Physical Education: A Review of Theory and Research. J. Teach. Phys. Educ,, 24: 205-225.
Wilson S (1998). The effect of two teaching styles on children's skill performance and task analyses ability related to skill observation. Research Quarterly for Exercise and Sport; Abstract of Completed Research. Supplement A-107.